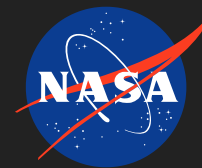


Developing Polarization Sensitive Detectors for Cosmic Microwave Background Research

Completed Technology Project (2012 - 2016)



Project Introduction

While great strides in cosmology have been made in the past decades, the cosmological picture is incomplete without an understanding of the mechanism of inflation and the nature of dark energy. The Cosmic Microwave Background (CMB) contains slight anisotropies in its temperature and polarization spectra that can be used to probe the mysteries of inflation and dark energy. However, the anisotropies in the CMB spectrum are very faint, making their measurement a technological challenge. Recent advances in detector technologies have ushered in an era in which cosmological parameters can be measured precisely from the CMB anisotropy spectra. However, the faint polarization signal in the CMB that holds information about inflation has yet to be detected. This proposal is for work on designing, testing, and fielding new, multi-frequency polarization detectors that will be deployed in large format focal plane arrays in the polarization receiver of the Atacama Cosmology Telescope (ACTPol) and an extension of the Atacama B-mode Search (ABS). These detectors will further enhance the sensitivity of measurements by adding multiple frequency bands of observation, which will allow for the improved removal of contamination to the signal from the Galaxy. Through ground-based observations, the new detectors will further constrain inflation by seeking to measure the inflationary polarization signal while serving as a testbed for future NASA inflationary probe satellite missions. This fellowship would allow me to contribute to the technological development and field-testing of new detectors that would aid NASA in reaching its scientific objectives while building the necessary expertise to be involved in future NASA missions.

Anticipated Benefits

These detectors will further enhance the sensitivity of measurements by adding multiple frequency bands of observation, which will allow for the improved removal of contamination to the signal from the Galaxy. Through ground-based observations, the new detectors will further constrain inflation by seeking to measure the inflationary polarization signal while serving as a testbed for future NASA inflationary probe satellite missions.



Developing Polarization
Sensitive Detectors for Cosmic
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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Responsible Program:

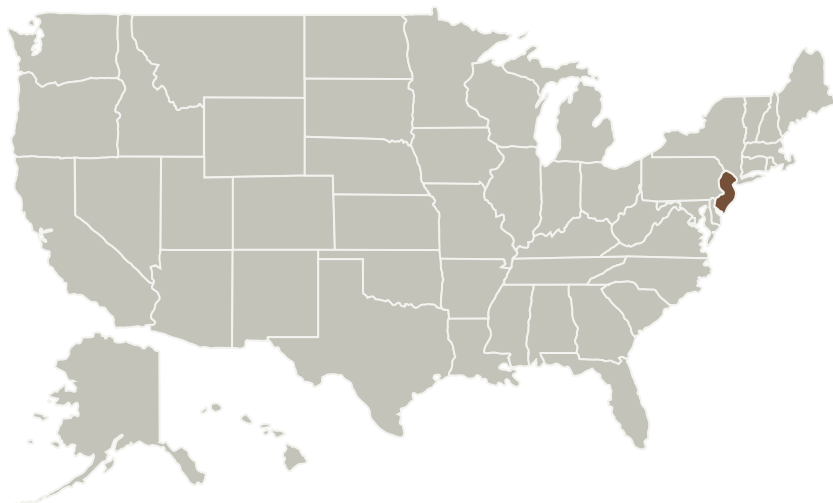
Space Technology Research
Grants

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Princeton University	Supporting Organization	Academia	Princeton, New Jersey

Primary U.S. Work Locations

New Jersey

Project Website:

<https://www.nasa.gov/directorates/spacetech/home/index.html>

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

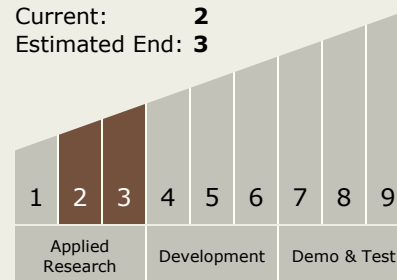
Suzanne Staggs

Co-Investigator:

Sara Simon

Technology Maturity (TRL)

Start: 2
Current: 2
Estimated End: 3



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.1 Remote Sensing Instruments/Sensors
 - TX08.1.1 Detectors and Focal Planes